**DATA PROCESSING SS 2**

**FIRST TERM**

**SCHEME OF WORK**

**WEEK TOPIC**

1 REVISION

2 DATA MODELS I

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11 REVISION

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**REFERENCE BOOK**

* Data processing for Senior Secondary Education by HiiT Plc.

**WEEK ONE**

**TOPIC: REVISION**

**Evolution of Computing and Computers**

The history of computing and computers is a fascinating journey through various technological milestones:

- Abacus: An ancient device used for arithmetic calculations.

- Napier’s Bones: Invented by John Napier, a precursor to modern multiplication tables.

- Slide Rule: A mechanical device for performing complex mathematical calculations.

- Schickard’s Calculating Clock: A seventeenth-century mechanical calculator.

- Pascal’s Calculator: A mechanical calculator invented by Blaise Pascal.

- Leibniz Multiplier: Developed by Gottfried Leibniz, one of the inventors of calculus.

- Analytical Engine: Designed by Charles Babbage, an early mechanical computer.

- Herman Hollerith Punch Card: Invented for data processing and used in early computing.

- John Von Neumann Machine: A theoretical model of a computer architecture.

**Number Systems Concepts**

Understanding various number systems is fundamental in computing:

- Binary (Base 2): Used in computers to represent data with 0s and 1s.

- Octal (Base 8): Occasionally used in computing for its concise representation.

- Decimal (Base 10): The standard base for human numerical representation.

- Hexadecimal (Base 16): Common in computing for its compact representation of binary data.

**History of Computers**

Computers have evolved through distinct generations:

- First Generation (Vacuum Tube): Early computers used vacuum tubes for data processing.

- Second Generation (Transistors): Transistors replaced vacuum tubes, reducing size and power consumption.

- Third Generation (Integrated Circuits): Integrated circuits allowed further miniaturization and improved performance.

- Fourth Generation (Microprocessor): The microprocessor revolutionized computing, leading to personal computers.

- Fifth Generation (Artificial Intelligence): This generation focuses on AI, robotics, and natural language processing.

**Classification of Computers**

Computers are classified based on several criteria:

- Type (Analogue, Digital, and Hybrid): Categorized by their data representation methods.

- Size (Micro, Mini, Mainframe, and Super Computers): Differentiated by their physical dimensions and capabilities.

- Purpose (General and Special): Classifications based on their specific use cases.

ICT Applications in Everyday Life

Information and Communication Technology (ICT) is integrated into daily life with diverse applications:

- Education: ICT is a vital tool in modern education, enabling e-learning and digital resources.

- Banking: ICT facilitates online banking, transactions, and secure financial services.

- Industry: Automation, data analysis, and robotics are key applications in industrial processes.

- Commerce: E-commerce platforms and digital marketing are transforming the business landscape.

**Impact of ICT on Society**

The influence of ICT on society is profound:

- Faster Communication Speed: ICT accelerates information exchange globally.

- Lower Communication Costs: Reduced expenses for communication and data sharing.

- Effective Information Sharing: Information dissemination is efficient and accessible.

- Paperless Environment: ICT promotes digital documentation, reducing paper usage.

- Borderless Communication: ICT transcends geographical boundaries.

- Social Issues: ICT brings about societal challenges and opportunities, including privacy and cybersecurity.

The history and evolution of computing, along with the various classifications of computers, demonstrate the remarkable progress of technology in our digital age. ICT's pervasive impact on education, banking, industry, and commerce underscores its transformative role in today's society.

**REVISON QUESTIONS**

1. Identify the Concrete device used in computing.
2. Convert the following decimal to Hexadecimal i. 4D5 ii 5F
3. Convert the following decimal to Octal i. 476 ii 57
4. Convert the following decimal to Binary i. 35.5 ii 37
5. Who invented the Pascal Calculator?
6. What is the name of the first mechanical calculating device?
7. How many generation of computer do we have?
8. List the device or major component that was used building the computer in each generation.
9. Another name for the Fifth generation computer is \_\_\_\_\_\_\_\_\_\_\_\_\_\_
10. List the classification of computer according to types, size and functionality
11. State five (5) impact of ICT on the society.
12. List the benefits of ICT to the society.
13. List the procedure for information processing.
14. List five advantages and three disadvantages of using computers for information processing.
15. Define information transmission and list the methods of information transmission with five examples each.
16. List three types of information transmission.
17. Define Operating System and give four examples of an operating system.
18. Mention five types of operating system (OS).
19. State four functions of an Operating System.
20. State the steps on how to carry out the following in MS- Word.

* Load / open an MS-Word application
* Open both new and existing document
* Save a document
* Retrieve an existing document
* Increase Font size, Change Font style, and Underline
* Change the case of a text
* Apply the following font effect; superscript, subscript, strikethrough.

1. Differentiate between Word processing and Word processor.
2. List four examples of word processor and mention four examples of MS Office.
3. List five major methods involved in copying a document in MS-Word.
4. List five features of a typical Word Processor.
5. Define Spreadsheet and state three uses of spreadsheet.
6. List five examples of a spreadsheet package.
7. State the steps on how to carry out the following in MS-Excel

* To delete cells, rows and columns
* To insert cells, rows and columns
* Find data or find and replace data

1. Differentiate between Database and Database Management System.
2. List five examples of a DBMS.
3. Define the following basic terms used in database management system;

Character, field, record, database file, key

1. State three uses of database management system.
2. Define Computer ethics and state three Computer room Management Ethics.
3. List three proper ways of using the computer and four ways of misusing computers.
4. State four safety measures for computer users
5. State four safety rules when using the computer lab.

**WEEK TWO**

**TOPIC: DATA MODELS I**

* Definition of Data Model
* Concept of Data Modelling

**INTRODUCTION TO DATA MODELLING**

Throughout the evolution of system development and data modelling, various phases and methods have shaped the field:

The primary goal during the System Development Life Cycle (SDLC) was to create a set of programs that could automate business processes. Initially, processing was the dominant focus in information systems, rather than the data or information itself. As technology and system complexity advanced, methodologies and modelling techniques were introduced to enhance the quality of deliverables and enable novice programmers to follow repeatable SDLC processes.

**Definition of Data Modelling**

Data modelling is the systematic process of structuring and organizing data. Typically, these data structures are implemented in database management systems. Beyond organization, data modelling can also impose constraints on data placed within these structures. Information systems are primarily responsible for managing large quantities of structured and unstructured data. Data models describe structured data, such as that stored in relational databases, but do not encompass unstructured data like word processing documents, emails, images, or digital audio and video.

**Key Concepts in Data Modelling**

Data modelling encompasses crucial concepts:

- Data modelling techniques and tools facilitate the translation of complex system designs into easily understandable representations of data flows and processes, creating a blueprint for construction and re-engineering.

- Data models provide the structure for data used within information systems, offering specific definitions and formats.

- Data models illustrate the data flow and logical interrelationships among different data elements.

- Consistency in data can be achieved by using a data model consistently across systems.

The term "data model" refers to two distinct aspects: the description of data structure and the way data is organized within a Database Management System (DBMS).

Data Structure and Data Organization

- Data Structure: A data model describes the arrangement of data within a specific domain and, by extension, the underlying structure of that domain.

- Data Organization: A data model also details how data is organized using a database management system.

Approaches in Data Modelling

Data modelling involves various approaches:

- Conceptual Data Modelling: This initial step identifies high-level relationships between different entities, laying the groundwork for organizing data requirements.

- Logical Data Modelling: The logical model outlines the specific entities, attributes, and relationships involved in a business function and serves as the foundation for the physical data model.

- Physical Data Modelling: It represents the application and database-specific implementation of a logical data model, describing the physical mechanisms used for data storage.

General Evaluation

1. Different Approaches to Data Modelling: Data modelling encompasses conceptual, logical, and physical approaches to represent and structure data.

2. Data Modelling Definition: Data modelling is the process of organizing data and defining its structure for storage within a database management system.

The evolution of system development and data modelling has shifted the focus from mere processing to holistic data organization, providing a comprehensive understanding of complex information systems.

**READING ASSIGNMENT**

Data Processing for Senior Secondary Education by HiiT Plc. Chapter One, page 55

**WEEKEND ASSIGNMENT**

**Instruction:** Choose the correct option from the ones lettered A to D

1. In the approach of data modeling \_\_\_\_ data modeling illustrate the specific entities, attribute and relationship involved in business function.
2. Conceptual Data Modeling (b) Logical Data Modeling (c) Flat data Modeling

(d)Physical Data Modeling

1. The processing of structuring and organizing data is referred to as \_\_\_\_\_\_

(a)Data Structure (b) Data Organization (c) Data Manipulation (d) Data Modeling

3. The major concept for data modeling is to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(a) Translate simple system design to complex representation of data

(b) Translate complex system design to simple representation of data

(c) Translate simple system design to simple representation of data

(d) Translate complex system design to complex representation of data

1. The term “Data Model” refers to two different things- data organization and \_\_\_\_\_\_\_\_
2. Data Model (b) Data Processing (c) Data Structure (d) Data Organization
3. The following are unstructured data Except
4. Video (b) email message (c) Picture (d) Database

**SECTION B**

1a.     Define data modeling.

1. List three (3) approaches to Data modeling.

2. State the major concept of Data Modeling.

**WEEK THREE**

**TOPIC: DATA MODELS II**

**TYPES OF DATA MODELLING**

**Flat Model:** The flat Model (or Table) model consists of a single, two-dimensional array of data elements, where all members of a given column are assumed to be similar in values, and all member of row are assumed to be related to one another.

Flat Model

|  |  |  |  |
| --- | --- | --- | --- |
|  | Route No. | Miles | Activities |
| RECORD 1 | 1 – 95 | 12 | Overlay |
| RECORD 2 | 1 -495 | 05 | Parching |
| RECORD 3 | SR – 301 | 33 | Crack Seal |

**HIERARCHICAL MODEL**

In a hierarchical database, data is organized into an upside-down tree-like structure, implying a single upward link in each record to describe the nesting, and a sort field to keep the records in a particular order in each same-level list. Hierarchical structures were widely used in the early mainframe database management systems.

**Hierarchical Model**

Pavement Improvement

Reconstruction

Maintenance

Rehabilitation

Routine

Corrective

Preventive

**Network Model:** This model organizes data using two fundamental construct, called records and sets. Records contain fields, and sets define one-to-many relationships between records: one owner, many members.

Joint Seal

Flexible Pavement

Spall Repair

Silicone Sealant

Asphalt Sealant

Patching

Rigid Pavement

Creak Seal

Preventive maintenance

**EVALUATION**

* + - 1. Differentiate between Hierarchical and Network Model.
      2. Explain Flat data model.

**Relational Model**

The relational model or relational data base model is based on first-order predicate logic. Its core idea is to describe a database as a collection of predicates over a finite set of predicate variables, describing constraints on the possible values and combinations of values.

**Object-Relational Model**

The object relational model is similar to relational database model, but objects, classes and inheritance are directly supported in database schemas and in the query language. An object-relational database can be said to provide a middle ground between relational databases and object-oriented databases (OODBMS)

**Star Schema**

The star schema is the simplest style of data warehouse schema. The star schema consists of a few “fact table” (possibly only one, justifying the name) referencing any number of dimension tables”. The star schema is considered an important special case of the snowflake schema.

**GENERAL EVALUATION**

1. List and explain the types of data model.
2. With the aid of a chart, using the school setting as a case study, explain Network model.

**READING ASSIGNMENT**

Data Processing for Senior Secondary Education by HiiT Plc. Chapter One, pages 56

**WEEKEND ASSIGNMENT**

**Instruction:** Choose the correct option from the ones lettered A to D

1. One of the following is an example of a DBMS package.
2. Ms Word (b) Ms Power-point (c) Ms access (d) Ms Outlook

2. In the approach of data modeling \_\_\_\_ data modeling identifies the highest level relationship between different entities.

1. Conceptual Data Modeling
2. Logical Data Modeling
3. Flat data Modeling
4. Physical Data Modeling
5. \_\_\_\_ model organizes data using two fundamental construct called record and set.
6. Network (b) Relational (c) Object Oriented (d) Star Schema
7. \_\_\_\_model consists of a single, two-dimensional array of data elements.
8. Network (b) Relational (c) Object Oriented (d) Star Schema
9. \_\_\_\_database model is organized into an upside-down tree-like structure
10. Network (b) Relational (c) Object Oriented (d) Hierarchical

**SECTION B**

1. List and explain four types of database model
2. Define the following; Data, Field, record, File.

**WEEK FOUR**

**TOPIC: DATA MODELING I**

Database packages are used to design a database in a computer. Example of a common database package is Microsoft Access. MS Access is a Relational Database Management System used to create and modify databases.

**ORGANIZATION OF DATABASE USING MS ACCESS**

To create a database on the computer with MS Access

Load MS Access: do the following;

* Click on the Start Menu
* Point to All program
* Point to Microsoft Office
* Click on Microsoft office Access





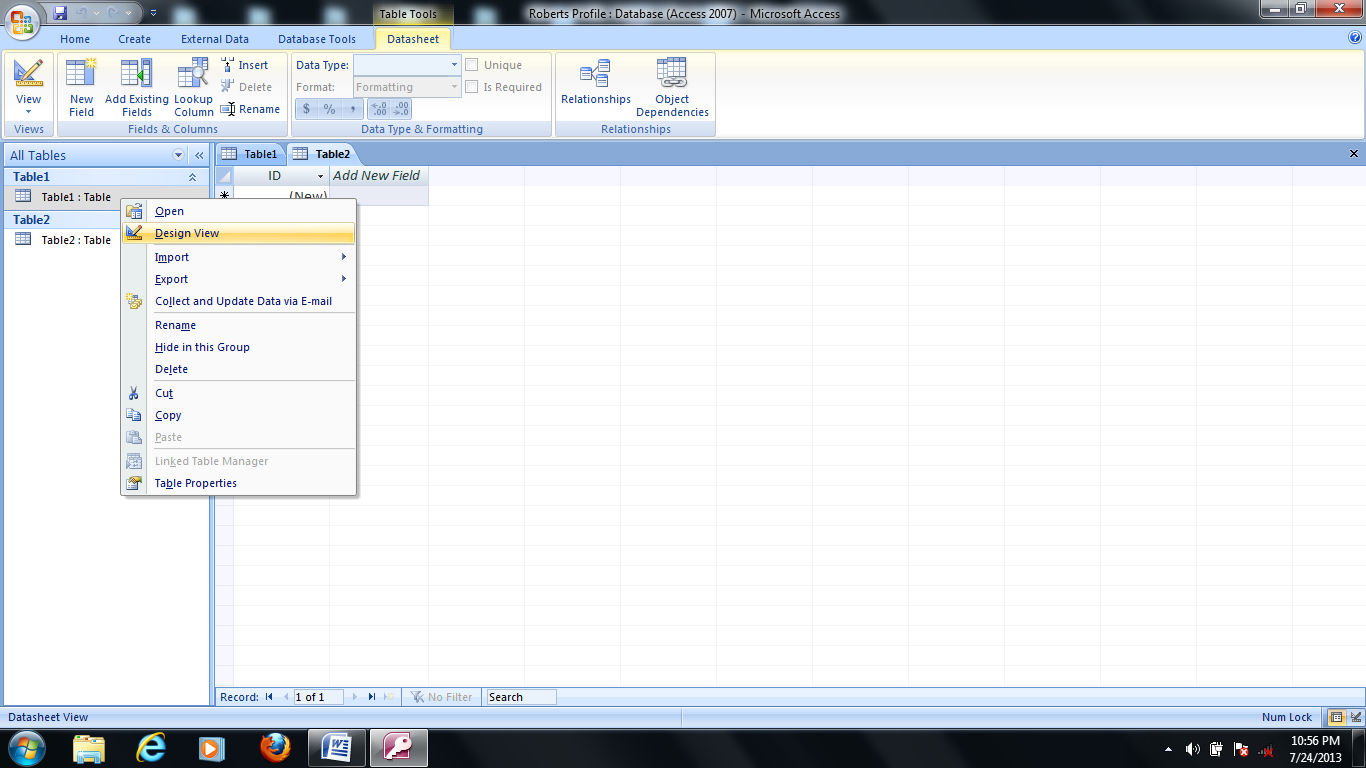
**Creating Database**

* From the displayed window, click on blank database.
* By the right hand side of the windows, where the arrow is pointing in the picture-screen above, click inside the file name text box and type the desired database name.
* Click on Create command button. A database with the filename given will be created

Files are created as tables in the database

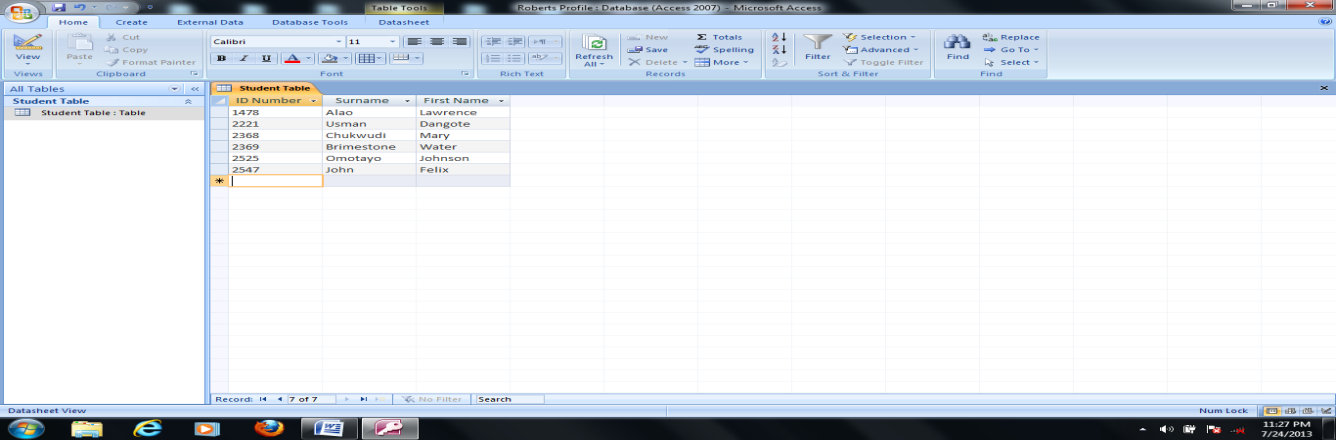
Creating a file

* Click on Create menu and select Table
* At all Tables tab, right click on any of the table.
* Select design View



In the Save As dialog box, type a desired table name (e.g. Student Table) in the Table Name text box and click ok.

Tables in database on a computer are composed of rows and columns. A table in MS Access is organized into rows and columns like the picture screen shown below.



A row contains records or diverse fields. The rows specify the number of records in the table. For example, in the picture-screen above, there are six records in the student table.

A column usually represents a field in a database table. It contains specify the type of information. For example, in the picture screen above, there are three fields (data fields), REG. No., Surname, and first name.

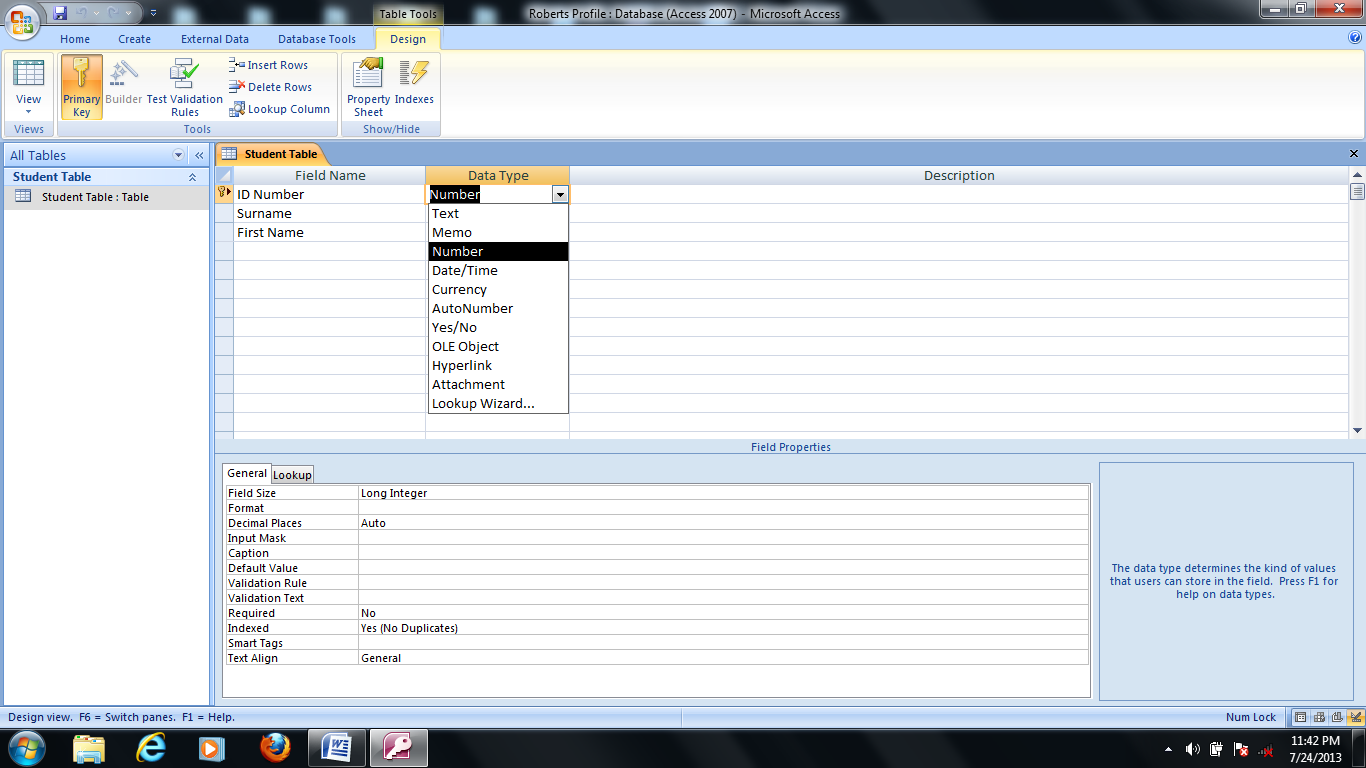
**EVALUATION**

1. List the steps on how to lad MS-Access.
2. List three (3) examples of Database package.

**Create Fields with Data Types**

Fields are assigned field names relevant to the information they keep. Field names are assigned data types which determine the kind of data they accept as input. For example in MS Access table above, Surname are alphabetic, the fields will not accept numeric (numbers) inputs 10 or 500 as surname. To set data type for field in MS Access, follow the steps below;

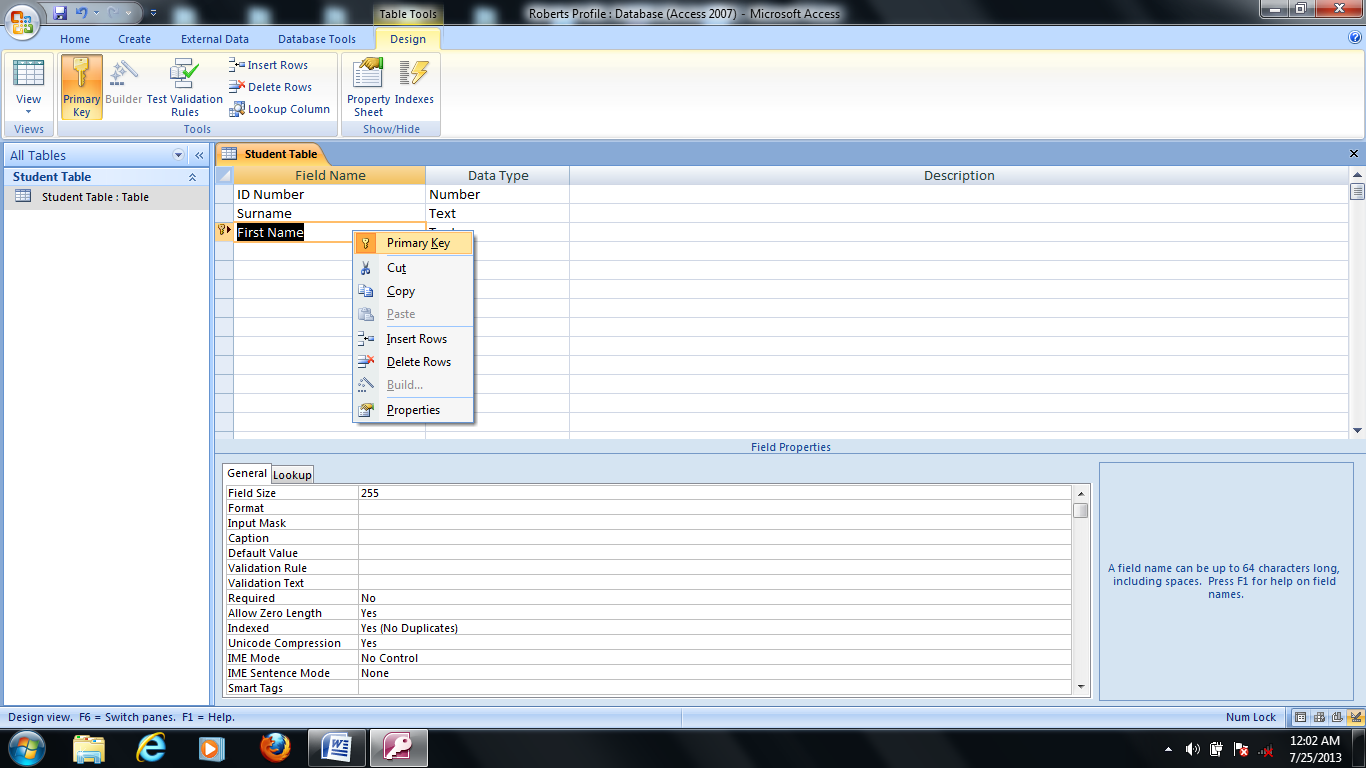
* After creating the table in design view under the field name tab, then type the field name and under the data type tab next to the field name, click the drop down menu and select AutoNumber as shown below.



For example, using the above picture screen, the field name ID Number will be assigned Number data type since the ID Numbers will be numeric. In the same way, TEXT data type will be assigned to Surname and First name.

Unique Identifier

A table contains a unique identifier i.e. a KEY. In MS Access, a default primary key is usually specified for the first field. To set another field of your choice as primary key, right click on the first cell and select Primary Key.



Note: The symbol of a key should appear beside the field, after setting that field as a unique identifier. If it does not appear repeat previous steps.

**Creating Database**

Generally, creating database using any DBMS entails the following basic steps:

**Define the Database Structure**

The database structure specifies the type of database organization that should be used. If the relational form is selected, the database structure will include RDBMS, structure of table, number of rows, number of columns, the key, and relationship of the database etc.

**Specify Field Type**

When a database is being created, all fields are set to accept a particular type of input by specifying a field type. A field type is also known as a Data type. The essence of a data type is to prevent a wrong input from being stored in a database (i.e. database integrity). Usually the name of a data type varies with DBMS but portrays a general meaning. These include;

* Alpha numeric/ text field: Fields that accepts both numbers and text e.g. ASP2548.
* Numeric Fields: Fields that accepts numbers in two forms: Real number i.e. decimal numbers e.g. 8.15, 9.1 and integers’ i.e. whole numbers e.g. 125, 80 etc.
* Date Fields: They store data in date format e.g. 11-04-2009
* Boolean fields: The data accepted by these fields are either Yes/No or True/False.
* Memo: Long text. Use for long pieces of text. Such as notes and long description. Can store up to 64,000 characters.
* Currency: Use for currency.
* AutoNumber: Unique sequential numbers or random number automatically inserted when you create a record. Use to create primary key.
* Hyperlink: Use to store hyperlink
* Attachment: use to store attachments e.g files, images etc.
* OLE Object: Use to attach an OLE object such as word document, Spreadsheet, or Powerpoint Presentation

**Input Data**

After the field names and their data types have been specified, then records are stored in the database by specifying the appropriate input. In MS Access, to input a data:

* Double click on the Student Table at the left hand pane of MS Access windows
* Enter the data beneath the field names and click on the next cell to populate data.

To keep database updated, data inputted into the database must be saved regularly. Keyboard command CTRL + S is used. Alternatively, you click on the Office button and save.

**EVALUATION**

1. How is a database created?
2. What are data types you can specify in Ms-Acess

**BASIC OPERATION**

The basic operations to be considered are:

* Searching
* Sorting
* Modifying
* Generate report

**Searching**

* On the Tools Menu, click Options
* Click the Edit/Find tab
* Under Default find/replace behave, do one of the following:
* Select Fast Search to search the current field and match the whole field.
* Select General search to search all fields and match any part of the field.
* Select Start of Field Search to search the current field and match the beginning characters of field.
* DBMS have certain command for saving a database. For example in MS Access, select the save option on the MS Access window to save.

**Sorting**

To sort records in form view or in datasheet view, follow these steps:

1. Start MS Access, and then open the database that you are working with.
2. Open the table or the form whose data you want to view.
3. Click the field that you want to use for sorting records. To sort records in sub-form, click the field that you want to sort. To sort records in a sub-datasheet, display the sub-datasheet by clicking expand indicator, and then click the field that you want to sort.
4. On the records menu, point to sort, and then click Sort Ascending or Sort Descending. NOTE: In a form, you can only sort on only one field at a time.

**Sorting with sub-datasheet**

In datasheet view, when you sort the sub-datasheet for one record, MS Access sorts all the sub-datasheets at that level. In a datasheet or sub-datasheet, you can select two or more adjacent columns at the same time, and then sort them. Access sorts records starting with the leftmost selected column. When you save the form or datasheet, Access saves the sort order.

Sorting Records on a Report

1. Start MS Access, and then open the database that you are working with.
2. Open the report in Design View.
3. On the View menu, click “Sorting and Grouping” to display the sorting and Grouping dialog box.
4. In the first row of the Field/Expression column, select a field name or type an expression. NOTE: When you fill in the Field/Expression column, MS Access sets the sort order to Ascending.
5. You can sort up to10 fields or expression in a report. To sort your report on more than one field, add another field or expression to the Field/Expression column. The field or expression in the first row is the first sorting level. The second row is the second sorting level, and so on.

**Modifying Data**

How to Add or edit Data in a Datasheet (Table or Query) or in a Form

1. Open a table or a query in datasheet View or a form in Form View.
2. Do one of the following:

* In MS Office Access 2003 or in earlier versions of Access, to add a new record, point to Go to on the Edit menu, and then click New Record. Type the data, and then press TAB to go to the next field. At the end of the record, press TAB to go to the next record.
* In MS Office Access 2007, to add a new record, click the Home tab, and then click New in the Records group.
* To edit data within a field, click in the field that you want to edit, and then type the data.
* To replace the entire value, move the mouse pointer to the leftmost part of the field until the pointer changes into the plus pointer, and then click. Type the data.

**NOTE:** To correct a typing mistake, press BACKSPACE. To cancel your changes both in current field and in the entire record, press ESC.

How to save a record in a Datasheet or in a Form

**NOTE:** MS Access automatically saves the record that you are adding or editing as soon as you move to a different record or close the form or table that you are working on.

Explicitly, to save the data in a record while you are editing, In Access2003 or earlier versions,

Click Save Record on the Records menu.

In Access 2007, Click the HOME tab, and then click Save in the Records group.

**How to Delete a Record in a Datasheet or in a Form**

1. Open a table or a query in Datasheet view or open a form in Form View.
2. Click the record that you want to delete.
3. In Access 2003 or in earlier versions, Click Delete Record on the Edit menu. In 2007, click the Home tab, and then Click Delete Record in the Delete list in the Records group.

**Generating reports**

1. AutoReport

* Open the database window (F11) and click on the Report tab.
* Click New. A dialog box appears.
* Choose between Columnar and Tabular.
* Select the table or query that you want to use for you report.
* Click OK.

1. Create Your Own Report

* Repeat the first two steps above.
* When the dialog box appears, click Design View.
* Select the table or query that you intend to use.
* Click OK.

1. Report Wizard

* Repeat the first two steps above.
* Click the wizard that you want to use for your report.
* Select the table or query that you want to use for your report.
* Click OK.
* Follow the instructions that the wizard provides.

**GENERAL EVALUATION**

1. State the operations that can be performed in a database.
2. List five (5) datatype.

**READING ASSIGNMENT**

Data Processing for Senior Secondary Education by HiiT Plc. Chapter Two, pages 58 - 63

**WEEKEND ASSIGNMENT**

**Instruction:** Choose the correct option from the ones lettered A to D

1. Another name for field type is known as \_\_\_\_ (a) File type (b) Name type (c) Record type (d) Data type
2. Another name for unique identifier is known as \_\_\_\_ (a) Key (b) Data (c) Field (d) Record
3. \_\_\_\_ is an attribute or field that can be used to identify a record in a database table or file. (a) Data (b) Field (c) Key (d) Table
4. \_\_\_\_ is used to design a database in a computer. (a) Database package (b) Graphics package (c) Spreadsheet package (d) Word Processing package
5. \_\_\_\_model organizes data using two fundamental constructs, called records and sets.

(a) Hierarchical (b) Relational (c) Network (d) Optical

**SECTION B**

1. Define database Model.
2. List and explain types of database Model.
3. All fields are set to accept a particular type of input, list and explain the data types.

**WEEK FIVE**

**TOPIC: DATA MODELING II**

Editing data type in fields

When creating tables, you should define the data types of the table to the most closely match the type of data that will be entered in the field.

To edit data type in Data sheet view.

1. Click the field you wish to define.
2. Click the Datasheet tab on the Ribbon.
3. Click the down arrow next to Data type.
4. Choose the type of data that will be entered into the field.

To edit the data of the format,

1. Click the field you wish to define.
2. Click the datasheet tab on the ribbon.
3. Click the down arrow next to the format.

To edit Data type in the design View,

1. Click design View.
2. Click the field name you wish to define or create (for new field).
3. Click the Data Type.
4. Choose the appropriate Data Type.
5. Format the field in the Field Properties dialog Box.

To Delete a Table,

1. Open the desired database by clicking the Microsoft office button and clicking Open.
2. Right click on a table and choose Delete.

To Rename a table,

1. Open the desired database by clicking the Microsoft office button and clicking Open.
2. Right click on a table and choose Delete.
3. Type in the new name.

**EVALUATION**

* + - 1. Write down steps on how to perform the following on MS Access; T

To edit data-type, delete a table and to rename a table

* + - 1. Write down steps on how to load MS Access.

**Creating Forms**

Forms allows you to enter, edit or display data. They are based on tables. With forms, you can choose the format and arrangement the fields will take or will be displayed.

**To create a form**

1. Open the navigation pane
2. Click the table or query on which you want to base your form
3. Activate the create tab
4. Click form in the forms group

After you create a form, you can save it. You can also open a saved form at any time.

1. Click the save button on the Quick Access toolbar.
2. Type the name you want to give the form.
3. Click OK. You can access the form by clicking the navigation pane.

Form Wizard

You can create forms with the help of a form wizard

On the create tab, click the more forms down arrow.

1. Click Form Wizard
2. Choose the Table/ Queries that you wish to have on the form
3. Choose the field you wish to have on the forms
4. Click Next
5. Choose the layout for the form
6. Click Next
7. Choose Style
8. Click next
9. Create a title for the form
10. Choose whether you want to open the form to view it or modify the form’s design
11. Click finish

**EVALUATION**

(1) What is a form?

(2) How would you create a form?

**Creating Queries**

A query allows you to select and filter data from multiple tables. Queries can be saved and utilized as often as you need them.

Creating using Query Wizard

The Query Wizard walks you through the steps to set up a query. To run a query using the query wizard

1. Click the create tab
2. Click the query Wizard button under other group
3. Choose the type of query you wish to run
4. Click OK

To choose the field you wish to include from each table

1. To select fields from different tables, click the Tables/Queries down arrow
2. Click OK

To insert picture of query wizard

1. Type in a title for the query
2. Click Finish
3. The query will be displayed

**CREATING REPORT**

Reports organize and summarize data for viewing online or for printing. A detail report displays all of the selected records. Reports are a means to view and analyse large amount of data. You can use the report wizard or create a custom report that meets your specific need.

1. Click the Blank report button on the Create Tab
2. Click the Add Existing Fields button
3. From the field list, click and drag the fields to the report

Creating using Report Wizard

1. On the Create tab, click ,the report Wizard button
2. Choose the Tables/Queries that you wish to have on the form
3. Choose the field you wish to have on the forms
4. Click Next
5. Choose the sort order for your report
6. Choose the layout for the form
7. Click Next
8. Choose a style
9. Click Next
10. Create a title
11. Choose whether you want to o[pen the form to view it or modify the form’s design
12. Click Finish

**GENERAL EVALUATION**

* + - 1. State the operations that can be performed in a database.
      2. List five (5) data-type.

**READING ASSIGNMENT**

Data Processing for Senior Secondary Education by HiiT Plc. Chapter Two, pages 58 - 63

**WEEKEND ASSIGNMENT**

1. Another name for field type is known as \_\_\_\_\_\_ (a) File type (b) Name type (c) Record type (d) Data type
2. Another name for unique identifier is known as \_\_\_ (a) Key (b) Data (c) Field(d) Record
3. \_\_\_\_ is an attribute or field that can be used to identify a record in a database table or file. (a) Data (b) Field (c) Key (d) Table
4. \_\_\_\_ is used to design a database in a computer. (a) Database package (b) Graphics package (c) Spreadsheet package (d) Word Processing package
5. \_\_\_\_ model organizes data using two fundamental constructs, called records and sets. (a) Hierarchical (b) Relational (c) Network (d) Optical

**SECTION B**

* + - 1. Define database Model.
      2. List and explain types of database Model.
      3. All fields are set to accept a particular type of input, list and explain the types of data types you know.

**WEEK SIX**

**TOPIC: DATA MODELING III**

**Significance of Data Model**

Data model is a great communication tool because it facilitates interaction and communication between the designers, programmers and end users. In essence it does not allow one party’s bias towards a certain view of a data (whether they consider to be most important) to take hold.

* A well-developed data model can even foster improved understanding of the organization for which the database design is developed.
* Data model help in structuring and organizing data. These data structure are then typically implemented in a database management system which is used mostly by organization for decision making.
* In addition to defining and organizing the data, data modelling will impose (implicitly or explicitly) constraints or limitation on the data placed within the structure

**Standard Data Model**

A standard data model or industry standard model (ISDM) is a data model that is widely applied in some industry, and shared amongst competitors to some degree. They are often defined by standard bodies, database vendors or operating system vendors. The most effective standard model have developed in the banking, insurance, pharmaceutical and automotive industries, to reflect the stringent standards applied to customer information gathering, customer privacy, customer safety, or just in time manufacturing.

They enable easier and faster information sharing because heterogeneous organizations have a standard vocabulary and pre-negotiated semantics, format, and quality standards for exchanged data.

**EVALUATION**

State the significance of Data Model.

What is another name for “standard data model”?

Example of Standard Data Models

1. ISO 10303: ISO 10303 is an ISO standard for the computer-interpretable representation and exchange of product manufacturing information.
2. ISO 15926: The ISO 15926 is a standard for data integration, sharing, exchange, and handover between computer systems.
3. IDEAS Group: The IDEA Group is the international Defence Enterprise architecture Specification for exchange Group. The deliverable of the project is a data exchange format for military Enterprise Architectures.

**GENERAL EVALUATION**

* + - 1. Explain the significance of data model.
      2. State two examples of standard data model.

**READING ASSIGNMENT**

Data Processing for Senior Secondary Education by HiiT Plc. Chapter Two, page 64

**WEEKEND ASSIGNMENT**

**Instruction:** Choose the correct option from the ones lettered A to D

Standard Data model can also be called \_\_\_\_.

1. Manufacture Standard data Model
2. Industry Standard data Model
3. Structured Standard data Mode
4. Enhanced Standard data Model

\_\_\_\_ are great communication tool because it allows interaction and communication between designers, programmers and end users.

1. Data Model (b) Normal Form (c) Database (d) Attribute

What is the full meaning of ISDM?

1. Industry Significant Data model
2. International Standard Data Model
3. International Significant Data Model
4. Industry Standard Data Model

\_\_\_\_ is the international defense enterprise architecture specification for exchange group. (a) Ideas Group (b) Standard Group (c) Best Group (d) Normal Group

The following are significance of data model except

1. It can foster improved understanding of the organization for which the database design is developed
2. It also imposes constraints or limitations on the data placed within the structure
3. It helps in structuring and organizing data
4. It creates database management system for organization

**SECTION B**

* + - 1. Give two (2) examples of Standard data Model.
      2. Explain the need for Industry Standard Data Model.

**WEEK SEVEN**

**TOPIC: NORMAL FORM**

A database management system is a collection of computer software that enables users to define, create and maintain a database. Defining a database involves specifying constraints for the data stored in the database, and normalization is a logical design method which minimizes duplicate, or redundant, data and design flaws. Normalization is the process of effectively organizing data in a database. The primary purpose of normalization is to allow update, insert and delete operations to be performed on a single database table and propagated throughout the database by means of the defined relationship.

There are two goals of the normalization process:

1. Eliminating redundant data ( for example storing the same data in more than one table)
2. Ensuring data dependencies make sense (only storing related data in a table)

**EVALUATION**

* + - 1. Define Normalization.
      2. Define Database Management System.

**NORMAL FORM**

The normal form (NF) of relational database theory provide critical for determining a table’s degree of vulnerability to logical inconsistencies and anomalies. The higher the normal form applicable to a table, the less vulnerable it is. Each table has a “Highest Normal Form”(HNF): by definition, a table always meets the requirements of its HNF and all normal forms lower than its HNF; also by definition, a table fails to meet the requirement of any normal form higher than its HNF.

Normal form theory deal with how to reduce the amount of redundancy of data within a given table. Each normal form represents a level. To satisfy each the requirements for certain level, the requirements for the previous level must be met. To reach the optimal normal form for the tables within a database, the creator starts with a large list of all the data that is to be held in the database, and then works through the normal forms until he can no longer break the data down into smaller table.

**GENERAL EVALUATION**

Explain Normal Form.

State the two goals of normalization process.

**READING ASSIGNMENT**

Data Processing for Senior Secondary Education by HiiT Plc. Chapter Two, Page 65

**WEEKEND ASSIGNMENT**

**Instruction:** Choose the correct option from the ones lettered A to D

1. \_\_\_\_ is a collection of computer software that enables users to define, create and maintain a database. (a) Database Management System (b) Normalization(c) Data Model (d) Normal Form

2.\_\_\_\_ is the logical design method which minimizes duplicate or redundant data and design flaws. (a) Database (b) Normalization (c) Form (d) Data Model

3. One of the goals of normalization process is \_\_\_\_ (a)Eliminate redundant data (b) Ensure data independencies (c) Allow Update, insertion and deletion(d) Create tables

4. The primary purpose of normalization is to \_\_\_\_ (a) Eliminate redundant data (b) Ensure data dependencies (c) Allow Update, insertion and deletion (d) Create tables

5. \_\_\_\_ is the process of efficiently organizing data in a database.

(a) Database(b) Normalization (c) Form (d) Model

**SECTION B**

1. What is Normal Form?

2. Differentiate between a common sense and systematic normalization

**WEEK EIGHT**

**TOPIC: NORMAL FORM II**

**Types of Normal Form**

First Normal Form (1NF)

First Normal Form (1NF) says that all column values must be atomic. 1NF dictates that, for every row by column position in a given table, there exist only one value, not an array or list of values i.e in 1NF, the following rules are observed;

* + - 1. Eliminating repeating information
      2. Create separate tables for related data.

**Second Normal Form (2NF)**

The second normal form (2NF) further addresses the concept of removing duplicate data. The rule for the second normal form is;

Remove subsets of data that apply to multiple rows of a table and place them in separate table.

Create relationships between these new tables and their predecessors through the use of foreign keys.

**EVALUATION**

* + - 1. State the rules for carrying out first normal form (1NF).
      2. State the rules for carrying out second normal form (2NF).

**NOTE:** The 2NF attempts to reduce the amount of redundant data in a table by extracting it, placing it in new table(s) and creating relationships between those tables.

**Third Normal Form (3NF)**

There are two basic requirements for a database to be in Third Normal Form:

1. The requirements of both 1NF and 2NF must have been met.
2. Remove columns that are not fully dependent upon the primary key.

**The Fourth Normal Form (4NF) and Fifth Normal Form (5NF)**

The fourth and the fifth normal form are beyond the scope of this syllabus.

Note: Both the fourth and the fifth normal form still follows the goal of normalization process, which are;

1. eliminating redundant data.
2. ensuring data dependencies make sense.

**GENERAL EVALUATION**

* + - 1. State the goal of normalization process.
      2. State the rules for carrying out the first normal form (1NF)

**READING ASSIGNMENT:** Data Processing for Senior Secondary Education by HiiT Plc. Chapter Three, pages 65 - 67

**WEEKEND ASSIGNMENT**

**Instruction:** Choose the correct option from the ones lettered A to D

\_\_\_\_ normal form says that all column values must be atomic.

1. 1NF (b) 2NF (c) 3NF (d) 4NF

\_\_\_\_ normal form must meet the requirement of first and second.

1. 1NF (b) 2NF (c) 3NF (d) 4NF

\_\_\_\_ normal form are beyond the scope for the syllabus.

1. 1NF and 2NF (b) 2NF and 3NF (c) 3NF and 4NF (d) 4NF and 5NF

One of the following is a basic requirement for database to be in the third normal form.

1. Remove columns that are not fully dependent upon the primary key
2. Create relationship between these new tables
3. Eliminate repeating information
4. Remove subsets of data that apply to multiple rows

How many value(s) exist in 1NF for every row-by-column position in a given table?

(a) one (b) two (c) three (d) four

**SECTION B**

State the rules for carrying out first normal form.

State the rules for carrying out second normal form.

**WEEK NINE**

**TOPIC: NORMAL FORMS III**

**KEY**

A key is an attribute or field that can be used to identify a record in a database table or file.

The **primary Key** is a unique attribute that can be used to identify a record in a database table. For Example, in the student database table above, the attribute that is unique to identify each record is the Student-ID or RegNo.

**CONCEPTS OF FOREIGN KEY**

A foreign key is a field in a relational table that matches a candidate key of another table. A foreign key (FK) is a column or combination of columns that is used to establish and enforce a link between the data in two tables. You can create a foreign key by defining a FOREIGN KEY constraint when you create or modify a table. The foreign key can be used to cross-reference table. The foreign key identifies a column or set of columns in one (referencing or child) table that refers to a column or set of column in another (referenced or parent) table. The columns in the child table must reference the columns of the primary key or other super key in the parent table.

Primary Key

|  |  |
| --- | --- |
| STUDENT INFORMATION | |
| 1 | StudentID |
| 2 | StudentName |
| 3 | Address |

|  |  |
| --- | --- |
| STUDENT COURSE | |
| 1 | StudentID |
| 2 | CourseID |
| 3 | CourseName |

Foreign Key

**EVALUATION**

* + - 1. Define Key as regards to database.
      2. Differentiate between primary key and foreign key

**EXPLAIN THE DETERMINATION OF NORMAL FORM**

Normalization is a technique for producing a set of suitable relations that support the data requirements of an enterprise. Characteristics of a suitable set of relations include:

The minimal number of attributes necessary to support the data requirements of the enterprise

Attributes with a close logical relationship are found in the same relation.

Minimal redundancy with each attribute represented only once with the important exception of attributes that form all or part of foreign keys.

**READING ASSIGNMENT**

Data Processing for Senior Secondary Education Hiit Plc. Chapter Four Page 67.

**WEEKEND ASSIGNMENT**

**Instruction:** Choose the correct option from the ones lettered A to D

* + - 1. \_\_\_\_ is a unique attribute that can be used to identify a record in a database table.

1. Foreign Key (b) Primary Key (c) Secondary Key (d) Elementary Key
   * + 1. \_\_\_\_ is a field in a relational table that matches a candidate key of another table.
2. Foreign Key (b) Primary Key (c) Secondary Key (d) Elementary Key
   * + 1. \_\_\_\_ is a technique for producing a set of suitable relations that support the data requirements of an enterprise.
3. Normal Form (b) Entity (c) Attribute (d) Normalization
   * + 1. One of the following is not a part of the characteristics that support the data requirements of an enterprise.
4. The minimal number of attributes necessary to support the data requirements of the enterprise
5. Attributes with a close logical relationship are found in the same relation.
6. Minimal redundancy with each attribute represented only once with the important exception of attributes that form all or part of foreign keys.
7. Attributes with a open logical relationship are found in the same relation.
   * + 1. \_\_\_\_ is an attribute or field that can be used to identify a record in a database table or file. (a) Key (b) Attribute (c) Entity (d) Relationship

**SECTION B**

Using tables, explain the differences between primary key and foreign key.

State two characteristics of suitable relations that support the data requirements of an enterprise.

**WEEK TEN**

**TOPIC: ENTITY – REALATIONSHIP MODELS**

Entity-Relationship is a graphical representation of entities and their relationships to each other. Entity relationship diagrams (ERDs) illustrate the logical structure of database. Diagrams created to design these entities and relationships are called entity-relationship diagrams or ER diagram.

**Uses of Entity Relationship Diagram**

1. The Entity-Relationship Diagram is used to identify the data that must be captured, stored and retrieved in order to support the business.
2. The Entity-Relationship Diagram is also used to identify the data required to derive and generate report on the performance measures that an organization should be monitoring.

Components of Entity-Relationship

Entity- Relationship diagrams have three different components;

* Entities
* Attributes
* Relationships

**Entities:** Entities are objects or concepts within the data model. Each entity is represented by a box with in the ERD. An entity might be considered a container that holds all of the instances of a particular thing in a system.

**Attributes:** a key attribute is the unique, distinguishing characteristics of the entity. Primary key is always the attribute of ER. Entities are further described by their attributes (sometimes called data element). These are the smallest units of data that can be described in a meaningful manner.

**Relationship:** A relationship is an association among the instances of one or more entity types that is of interest to the organization. A relationship is the association between entities or entity occurrence

**Cardinality:** The cardinality defines the relationship between the entities in terms of numbers.

**EVALUATION**

* + - 1. Define the following; Entity, Attribute and relationship.
      2. State the uses of entity-relationship diagram.

Types of cardinality relationship

There are potentially three types of relationship which can exist between different entities;

* One-to-One Relationship
* One-to-Many Relationship
* Many-to-Many Relationship

**GENERAL EVALUATION**

1. What is Cardinality?
2. Mention and explain three types of relationship with example.

**READING ASSIGNMENT**

Data Processing for Senior Secondary Education Hiit Plc. Chapter Four Pgs69 - 70.

**WEEKEND ASSIGNMENT**

**Instruction:** Choose the correct option from the ones lettered A to D

1. \_\_\_\_ is the unique, distinguishing characteristic of the entity.
2. Entity B. Relationship C. Attribute D. cardinality
3. Another name for data Element is \_\_\_\_.
4. Attribute B. Key C. Entity D. Relationship
5. \_\_\_\_ are objects or concepts within the data model.
6. Attributes B. Relationship C. Cardinality D. Entity
7. A roof covering a building will be considered in relationship as?
8. One-to-Many
9. Many-to-Many
10. One-to-One
11. Many-to-One
12. A pastor preaching to his congregation will be considered in relationship as?
13. One-to-Many
14. Many-to-Many
15. One-to-One
16. Many-to-One

**SECTION B**

* + - 1. List with example, the types of cardinal relationship.
      2. State the uses of entity-relationship diagram.

**WEEK ELEVEN**

**REVISION**

**WEEK TWELVE**

**EXAMINATION**